PROJECT **facts**

U.S. DEPARTMENT OF ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Environmental and Water Resources

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AMBIENT $PM_{2.5}$ SAMPLING AND ANALYSIS— THE UPPER OHIO RIVER VALLEY PROJECT

U.S. Department of Energy Investigates the Nature and Composition of Airborne Fine Particulate Matter and Its Precursors

PARTNERS

Advanced Technology Systems, Inc.
Pittsburgh, Pennsylvania

Desert Research Institute
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Ohio University
Athens, Ohio

PROJECT LOCATIONS

Pittsburgh, Pennsylvania

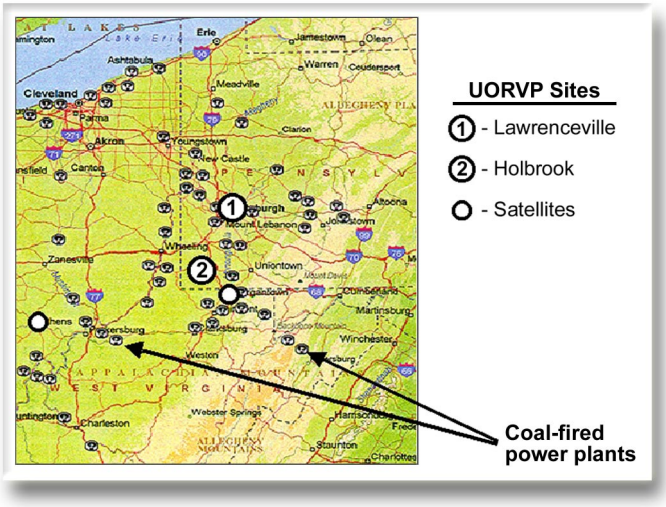
Holbrook, Pennsylvania

Morgantown, West Virginia

Athens, Ohio

Description

In response to growing concerns over particulate matter emitted into the atmosphere from anthropogenic sources, especially particles less than 2.5mm in diameter ($PM_{2.5}$), the Department of Energy's National Energy Technology Laboratory (DOE-NETL) has initiated a research and development program aimed at improving the understanding of the effect of energy production on ambient PM levels. The overall goals of the NETL fine PM program are to: (1) provide the applied science needed to quantitatively relate the emissions from energy production (and use), particularly from coal-fired power plants, to ambient air PM concentrations at downwind receptors; and (2) inform decision makers about management options applicable to coal-fired power generation to achieve the national PM standards. The Upper Ohio River Valley Project (UORVP) is the first major project initiated under the DOE-NETL fine PM program, and forms the core around which the remainder of the program is developed.



In cooperation with key stakeholders including EPA, local and state environmental agencies, industry, and academia, the UORVP has established a network for monitoring and characterizing $PM_{2.5}$ in the Upper Ohio River Valley. This region was chosen because it has a high density of coal-fired electric utilities, heavy industries (e.g, coke and steel making), light industry, and transportation emission sources. It is also ideally situated to serve as a platform for the study of interstate pollution transport issues. This region, with its unique topography (hills and river valleys) as well as a good mix of urban and rural areas, has a high population of elderly who are susceptible to health impacts of fine particulate as well as other related environmental issues (e.g., acid rain, Hg deposi-tion, ozone). A world-class medical research/university system is also located in the region, which will facilitate the subsequent use of the air quality data in studies of $PM_{2.5}$ health effects.

Ambient $PM_{2.5}$ Sampling and Analysis—The Upper Ohio River Valley Project

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The UORVP includes two urban and two rural monitoring sites that were part of existing local and/or state air quality programs. The primary urban site, located in the Lawrenceville section of Pittsburgh, PA, is an air quality monitoring station operated by the Allegheny County Health Department. The primary rural site is collocated with the Pennsylvania Department of Environmental Protection near Holbrook, Greene County, PA. The Lawrenceville and Holbrook sites both contain several types of filter-based PM monitoring equipment, continuous samplers for co-polluting gases (CO, SO_2, NO_x, NH_3, etc.) and surface meteorological stations. Sampling at Lawrenceville and Holbrook consists of one filter-based sample every sixth day throughout the year, along with month-long intensive (four samples daily at Lawrenceville and one sample daily at Holbrook) periods during the summer and winter of 1999 through 2001. A "satellite" urban site is collocated at a West Virginia Division of Environmental Protection monitoring station at the Morgantown, West Virginia, airport, while a satellite rural site is collocated at a site operated by the Ohio Environmental Protection Agency near Athens, Ohio. Samplers at Morgantown and Athens collect one filter-based $PM_{2.5}$ sample every sixth day. Measurements under the UORVP began in early 1999 and will continue through the summer of 2001.

"Urban" Air Quality Monitoring Station at the Lawrenceville Site

"Rural" Air Quality Monitoring Station at the Holbrook Site

Preliminary analysis of data collected during the first 18 months of the UORVP showed that: (1) the median mass and composition of $PM_{2.5}$ were similar for both Lawrenceville and Holbrook, suggesting that the sites were impacted more by regional than by local effects; (2) there were no significant differences in the particulate trending and levels observed at both sites between Summer 1999 and Summer 2000; (3) sulfate levels predominated at both sites during winter intensive sampling; and (4) $PM_{2.5}$ and PM_{10} mass concentration levels were consistently higher in summer than in winter, with intermediate levels being observed in the fall. As the UORVP progresses, data analysis will focus on relating the aerometric measurements to local and regional scale emissions of sources of primary and secondary fine particles using receptor-based air quality models.